

SYSTEM AND METHOD FOR CHARACTERIZING OPTICAL SYSTEMS
USING HOLOGRAPHIC RETICLES

ABSTRACT OF THE DISCLOSURE

Characterization of an optical system is quickly and easily obtained in a single acquisition step by obtaining image data within a volume of image space. A reticle and image plane are positioned obliquely with respect to each other such that a reticle having a plurality of feature sets thereon, including periodic patterns or gratings, is imaged in a volume of space, including the depth of focus. Metrology tools are used to analyze the detected or recorded image in the volume of space through the depth of focus in a single step or exposure to determine the imaging characteristics of an optical system. Focus, field curvature, astigmatism, spherical, coma, and/or focal plane deviations can be determined. The present invention is particularly applicable to semiconductor manufacturing and photolithographic techniques used therein, and is able to quickly characterize an optical system in a single exposure with dramatically increased data quality and continuous coverage of the full parameter space. In embodiments, the test reticle is holographically generated by interfering two or more beams of optical radiation. The resulting interference pattern is recorded on a reticle and used for testing the optical system. The geometry of the holographic interference pattern is tightly controlled by the properties of the interfering beams and is therefore more accurate than conventional reticle writing techniques.

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